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10/587,955	07/31/2006	Peter S. Cartwright	19583/101/111	5692

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EXAMINER

ZALASKY, KATHERINE M

ART UNIT

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1797

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/587,955

Applicant(s)

CARTWRIGHT, PETER S.

Examiner

KATHERINE ZALASKY

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2009.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
4a) Of the above claim(s) 10-16 is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-9 and 17 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 31 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date 20081117
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group I in the reply filed on 4 June 2009 is acknowledged.
2. **Claims 10-16** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 112

3. **Claims 1-9 and 17** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The recitation of "(c) directing unmodified liquid from the brine tank to the nanofilter" in **claim 1** is indefinite because it is not clear how unmodified liquid may be drawn from the brine tank. Brine which has been run through the water softener is being directed back into the brine tank; therefore, either all liquid which is contained in the brine tank is unmodified, even if run through the water softener or nanofilter, or there are separate sections within the brine tank. For the purpose of this Office Action, liquid which has run through the water softener will be treated as unmodified liquid.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1, 2, 9 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Chen (US 6,666,971).**

Regarding **claim 1**, Chen discloses a process for regenerating a water softening system, said process of the type that removes multivalent ions from water (C2/L2-16, Figures 3-3(b)), the water softening system including:

- a softening tank through which the water to be softened passes from an upstream to a downstream end (Figure 3(b), softener tank 16)
- a brine tank for holding a monovalent regenerating brine solution (Figure 3(b), tank, from which usable brine line 126 extends)
- a first diverter valve connected between the brine tank and the upstream end of the softening tank (Figure 3(b), control valve 58)
- a nanofilter, having upstream and downstream sides, for passing monovalent ions to the downstream side and retaining multivalent ions on the upstream side (Figure 3(b), C5/L40-43, nanofilter 110)
- a second diverter valve connecting between the downstream end of the softening tank and selectively to the upstream side of the brine tank (Figure(b), control valve 24)
- a connection between the downstream side of the nanofilter and the brine tank (Figures 3, 3(b), line 112)

said process comprising the steps of:

- a) operating the first diverter valve to pass brine solution from the brine tank through the softening tank of the water softening system (Figure 3(b), C2/L2-16, C5/L30-52)
- b) operating the second diverter valve to direct liquid from the downstream end of the softening tank to the brine tank (Figure 3(b), C2/L2-16, C5/L30-52)
- c) directing unmodified liquid from the brine tank to the nanofilter (Figure 3(b), C2/L2-16, C5/L30-52)
- d) directing the liquid on the downstream side of the nanofilter to the brine tank (Figure 3(b), C2/L2-16, C5/L30-52)
- e) directing the liquid on the upstream side of the nanofilter to a drain (Figure 3(b), C2/L2-16, C5/L30-52, line 114 to waste)

Regarding **claim 2**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process wherein the water softening system includes a pump receiving brine solution from the brine tank and supplying brine solution to the nanofilter, and including the step of powering the pump concurrently with operating the second diverter valve (Figure 3(b) & 4, pump 128, pump 202).

Regarding **claim 9**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process including the step of maintaining the concentration of the brine in the brine tank above approximately 10% (C5/L61-C6/L3).

Regarding **claim 17**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process including the step of

maintaining the concentration of the brine in the brine tank above a predetermined concentration (C5/L61-C6/L3).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 6,666,971), as applied to claims 1 and 2 above, and further in view of Le Dall (US 4,275,448).

Regarding **claims 3-4**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process wherein the water softening system includes a third diverter valve receiving the brine solution from the second diverter valve (Figure 3, sensor S₁, valve prior to brine tank, C5/L53-C6/L14). The reference does disclose that a sensor is used to measure the salt concentration or other variables in the stream, but does not explicitly disclose that the process includes the

step of directing liquid from the second diverter valve away from the brine tank responsive to a predetermined condition. Moreover, the reference does not disclose that when the salinity concentration is below the predetermined level the liquid is directed from the second diverter valve away from the brine tank. Rather, Chen teaches that when the salt concentration does not fall between 10-15%, the salt content is adjusted in the brine tank by adding salt when the salinity is low or by adding fresh water when the salinity is high (C5/L53-C6/L14).

Le Dall discloses a method of ion exchange regeneration which includes a brine conductivity sensor to determine whether the brine is still suitable for regeneration. If the controls determine that the brine is unsuitable, the system either discards the brine using a diverter valve or reprocesses the fluid (abstract, C2/L50-57).

It would have been obvious to one having ordinary skill in the art at the time of the invention to try diverting the liquid away from the brine storage tank instead of adjusting the salt content in the brine tank of Chen, as taught by Le Dall and Woolacott, since doing so represents nothing more than the choice between a finite number of identified, predictable solutions for handling liquids with undesirable properties.

Regarding **claim 5**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process wherein the water softening system includes a third diverter valve receiving the brine solution from the second diverter valve (Figure 3, sensor S₁, valve prior to brine tank, C5/L53-C6/L14). However, the reference does not disclose the steps of timing from the start of the operating step for the second

valve and responsive to said timing exceeding a predetermined time, directing fluid from the second diverter valve away from the brine tank.

Le Dall discloses that in addition to conductivity measurements, the time of the regeneration processes may be kept and compared to a pre-set length of time in the electronic controller. In the event that the time for the process reaches the pre-set length of time the electronic controller will suspend operation to prevent any damage to the system (C13/L18-50).

It would have been obvious to one having ordinary skill in the art at the time of the invention to use a clock function in the method of Chen to time the regeneration process in the water softener and compare the time to a pre-set length of time, as taught by Le Dall, since doing so adds an additional check on the process to ensure proper operation of the system.

While neither Chen nor Le Dall explicitly disclose that the liquid stream is diverted from the system in response to the time reaching the pre-set length of time, it would have been obvious to one of ordinary skill that the liquid may be diverted from the system instead of simply shutting the system off. The choice to divert liquid from the system will both prohibit an excess volume of liquid from entering the brine storage tank and prohibit any brine which may not meet quality standards from returning to the brine tank and damaging the proper operation of the system.

9. **Claims 6-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 6,666,971), as applied to **claims 1 and 2** above.

Regarding **claim 6**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process including the step of directing the fluid from the brine tank, unmodified, to the nanofilter (Figures 3-3(b), C2/L2-16, C5/L30-52). While the reference does disclose that the treated brine leaving the nanofilter will have a bivalent ion concentration ranging from 500 to 1000 ppm (C2/L32-42, 0.05-0.1%), it does not disclose that the nanofilter has a maximum of approximately 20% monovalent salts rejection. Rather, the reference teaches that nanofilter will typically pass 50% of the volume through the nanofilter, thereby only recovering 50% of the monovalent salt content. In order to obtain a higher salt content, the rejected liquid may be passed through an additional nanofilter (Figure 4, C6/L39-51). It would have been obvious to one having ordinary skill in the art to use multiple nanofilters in order to obtain the desired salt content.

Regarding **claims 7 and 8**, Chen discloses all of the claim limitations as set forth above. Additionally, the reference discloses the process wherein the water softening system includes a valve connected to the upstream side of the nanofilter, and including the step of maintaining a higher pressure on the upstream side of the nanofilter than in the brine tank (Figure 4, valve 204, C6/L24-26). While the reference does not explicitly disclose that the valve is a throttling valve, it is well known in the art to use throttling valves prior to membrane filtration systems (as evidenced by Kohler, US 4,321,137, Figure, throttle 10, C2/L50-55). Therefore, it would have been obvious to one having ordinary skill in the art to choose to employ a throttle valve in the system of Chen since

doing so represents a choice from a finite number of predictable solutions for a valve positioned upstream of a membrane filtration unit.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KATHERINE ZALASKY whose telephone number is (571) 270-7064. The examiner can normally be reached on Monday-Thursday, 7:30am - 6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571)272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KZ/
15 July 2009

/Krishnan S Menon/
Primary Examiner, Art Unit 1797